

NEW SPECIES OF NORTH AMERICAN CYNIPIDÆ.

BY H. F. BASSETT.

The Cynipidæ described in the following pages are the accumulations of many years. They are, largely, the material sent me by correspondents from all parts of the United States, and I regret that circumstances have made it impossible for me to give earlier attention to their favors.

Besides the new species here described I have thirty or forty new species of galls, from which I have not yet succeeded in rearing any true gall-flies, many of them extremely interesting forms, but, except in one instance, I have left these to those naturalists who shall be so fortunate as to secure both the galls and their producers.

The reasons for the exception to what is, undoubtedly, the proper course, viz.,—not to describe a species from the gall alone—will appear in my monograph, the completion of which seems to myself not very far off.

I am not sure that the species here noticed are assigned to their proper genera in all cases, indeed, I think a few do not belong to any genus yet established, and for these provision must be made hereafter.

Although the recognized species in this country have increased from less than a dozen in 1862, when Baron Osten Sacken's "First Contribution to the History of the North American Cynipidæ," appeared, to more than two hundred, it is still too early to attempt a classification of our species that future discoveries shall not disturb.

Not until the relations of our agamous to their bi-sexual forms shall have been fully learned can such an undertaking give satisfactory results. For this reason I have abstained from genus making altogether, satisfied if my descriptions shall be found sufficiently full and accurate to be helpful in future studies of this interesting, but exceedingly difficult family.

RHODITES Hartig.**1. *R. lenticularis* n. sp.**

Lentile-shaped galls in the parenchyma of the leaves of *Rosa lucida*, showing on both the upper and underside and from .10 to .15

of an inch in horizontal, and .08 inch in vertical diameter. Comparatively few of the galls are single. Most are confluent and of irregular outline; and in some instances the entire leaf is covered, while in others the right or left lobe is thus covered. These galls resemble the European species *R. spinosissima*, but the latter are more nearly globular, and their vertical diameter is one-half more, while the horizontal is considerably less. The larval cell is much larger and the walls much thinner than in *R. lenticularis*, and, as will be seen, the insects differ much.

Gall-flies.—Female.—*Head* black; antennæ short, first three joints very dark reddish brown, remainder dull black; first and second joints globular, third one-half longer than the fourth, fourth slightly longer than the succeeding ones, which are short and thick, and distinct. *Thorax* black; mesothorax dull, not shining, finely rugose, and with microscopic hairs; parapsidal grooves smooth, rather large and distinct, only faint traces of the intervening lines that are usually seen in this genus; pleurae shining in the middle; scutellum very finely wrinkled or corrugated. *Abdomen* shining, deep yellowish red. *Legs* very dark reddish brown. *Wings* subhyaline, with an exceedingly faint reddish cloud on, and surrounding the radial area; in many specimens this cloud is scarcely discernible; veins slender, but distinct, second transverse, and those bounding the radial area largest; areolet always present, but a mere dot. Length of the body .08 inch.

♂.—*Wings* more nearly hyaline, and without any trace of cloudiness. Length .07 inch. (my only ♂ specimen is in poor condition)

Dr. Rudow states that the third antennal joint of *R. spinosissima* is three and a half times as long as the fourth. In *R. lenticularis* the third is only one and a half times as long as the fourth. *R. spinosissima* is larger and differs in other respects from *R. lenticularis*.

This species was discovered in eastern Massachusetts by Miss Cora H. Clarke, of Jamaica Plain. I am indebted to Miss Clarke not only for this, but for many other species of galls, several of which are new and will be described in this article.

2. *R. tumidus* n. sp.

GALLS.—These rose galls were received from Mr. A. H. Siler, who collected them in southern Utah, but from what species of wild rose I am not able to say. They are globular, and from three-fourths to one and one-fourth inches in diameter, and of the same spongy cellular consistence, internally, as *R. radicum* O. S. They appear to be enormously developed leaf buds, for the terminal half of many of them bears a faint resemblance to a half-opened rose, or a miniature cabbage, the lines on the surface being the outlines of leaves. They grow on the end of a woody stem, and are in most cases nearly sessile,

though in a few the stem is half an inch long. The upper half of the gall is covered with a thin, white, papery epidermis, which is usually torn and curled by the rapid growth of the gall itself.

The true bark beneath is red or brown, and quite smooth in fresh galls, but wrinkled when they become dry. The apex of several galls is crowned with sharp spines and such are found on the base, and stem of others. It is plain that each gall is a foreshortened branch and the gall-fly must lay her eggs in it at an early stage of its development. These galls are polythalamous.

Gall-flies.—Male and female. ♀.—*Head* black; antennæ black, first joint ovate, second globose, third twice as long as the fourth, which slightly exceeds the remaining ones. *Thorax* black, finely and evenly rugose or wrinkled, shining rather than dull, parapsidal grooves very fine, two short parallel lines on the anterior half of mesonotum and a short median line on the posterior half of the same and a smooth, shining ridge over the base of each wing; pleuræ rough, scutellum evenly rough or rugose. *Abdomen* very dark reddish brown, approaching black. *Legs* the same color. *Wings* with a yellowish tinge throughout, but deeply clouded on the veins that bound the radial area, and indistinctly so beyond its apex; veins distinct, except that the slender cubitus is scarcely discernible at its union with the first transverse; areolet large, and the veins bounding it of equal size. Length of the body .12 inch.

♂.—Black, except the abdomen and legs; these are darker, however, than those of the female. *Wings* subhyaline, with no cloudiness, except that along the veins bounding the areolet and the radial area. The yellowish tinge that pervades the wings of the female appears here, and is rather more intense than in that sex. *Abdomen* very small. Length of the body .10 inch.

3. *R. variabilis* n. sp.

GALLS.—Irregularly rounded, sometimes ovate or reniform, and varying so much in form and size as to make a description difficult. They are from one-quarter to three-quarters of an inch in diameter in the more regular forms, but the reniform specimens often exceed an inch in diameter. Polythalamous, but evidently so through the perfect coalescence of two or more galls. The surface, like that of a russet apple and the color, nearly the same. Some, gathered perhaps before they were fully matured, are of a darker color, and are shrunken. These last may possibly prove to be a distinct species, but the insects offer no essential points of difference.

The development of these galls is as variable as their form. Some appear to grow on the ends of the small branches, others are attached to the leaf stems, while others are developed from an abortive leaflet, while still others grow on the surface of fully developed leaves. Internally, they are of a rather solid, pith-like substance, and the larvæ have no free larval cell.

They were collected for me in southern Utah, in large numbers, by Mr. A. H. Siler.

Gall-flies of both sexes.—*Head* black, finely and evenly punctate on the vertex and with a few short microscopic hairs, broader than the narrow thorax; antennæ 14-jointed, first joint large and round, second also round, but very small, the third is more than twice as long as the two preceding taken together, the fourth one-half as long as the third, remaining joints are subequal; in the female the first and second joints yellowish brown, the rest dull black; in the male black throughout; in both sexes the antennæ are very slender, but those of the female are shorter. *Thorax* black, finely rugose and hairy like the head, though the hairs are longer, two smooth, parallel lines from the collar one-half way to the scutellum, and a very short median line from the scutellum that almost immediately disappears; the parapsidal grooves not smooth nor deep, converging rapidly as they approach the scutellum; scutellum small, rough and depressed at its junction with the mesonotum. *Legs*: coxæ dark, shining, lighter towards the femur; femur, tibia and tarsi dark yellowish brown; the legs of the male, especially the posterior pair, are considerably darker than those of the female. *Abdomen* of the female small, yellowish brown, darker towards the end, the first segment pedicellate, the second very long and nearly concealing the remaining ones; sheath of the ovipositor sharp pointed, as in all this genus; the *abdomen* of the male is very small and shining black. *Wings*: veins dark and heavy, cubitus very distinct and reaching quite to the first transverse; areolet medium size; radial area faintly clouded on the second transverse vein in the male, and more heavily clouded throughout in the female, except a small spot in the center; the cloudiness extends slightly beyond the apex of the radial area. Length: body male .10, female .11 inch.; wings, male .12, female .14 inch.

The description of the female does not apply to all the specimens of this sex reared from these galls, as in some the radial area has no cloud, but a simple broadening of the veins bounding it. As this difference is quite noticeable, and as the galls differ so much in form and size, I am inclined to believe that there may be here two distinct, but closely related species.

4. *R. Utahensis* n. sp.

Mr. Siler sent me from Utah, several years ago, some very large rose galls that did not differ, so far as I could see, from *R. radicum* O. S. It is true they were larger and less regular in form than that species and showed more plainly that they originated in a leaf bud. The largest specimen was three inches in diameter, and one or two others were nearly as large. They appeared to have grown near the surface of the ground, but not under moss or fallen leaves, as is the habit of *R. radicum*.

They were old galls and I reared nothing from them, but on cutting them open I found several perfect insects, evidently *Rhodites*,

and all of the male sex. The females seemed to have made their way out. On comparing them with the males of *R. radicum* I found them to agree so closely that I was disposed to look upon them as merely a variety of that species. Further study revealed some minor differences, and at least one characteristic that seemed to entitle them to rank as a distinct species.

The differences noted are as follows: the first joints of the antennæ are not as dark reddish brown as in *R. radicum*, the antennæ are not as long, the mesothorax is shining punctate, the punctuation much finer, the feet are not as dark, and, while the wings are possibly a shade deeper yellow, the clouded spots seen on the wings of *R. radicum* are wanting, and the enlargement of the second transverse vein at the base of the radial area in that species is wanting in this. But the most notable difference is, that while the parapsidal grooves in *R. radicum* almost touch each other at the posterior margin of the mesothorax, they are so widely apart in this species that the difference cannot escape notice.

There are species in this genus that resemble each other more nearly than these two, but in such cases the galls are very distinct. If further observations show it to be only a variety it is sufficiently marked to deserve a name.

5. ***R. nebulosus*** n. sp.

Round, hollow, thin shelled, monothalamous galls three-sixteenths of an inch, or less, in diameter, on the underside of the leaves of the wild rose (*Rosa blanda* and probably *R. carolina*). They are usually situated on the lateral veins on the lower half of the leaf and close to the mid-vein. The surface in the green galls is quite smooth, but when dry it is slightly rough and uneven, but not pubescent. There is no larval cell.

These galls are often parasitized, and such are sometimes quite solid and contain several larval chambers. The same often occurs in galls of *R. bicolor*. I have received this species from correspondents in widely separated sections, but in most cases the galls were immature when collected and produced nothing, and I have only one gall-fly, a male, of this species.

Gall-flies.—*Head* black, very broad, front from the eyes and including the base of the antennæ, perfectly flat; ocelli prominent, and included in a smooth, shining space bounded by a distinctly impressed line, outside of this space the vertex is hairy and finely reticulated; antennæ 14-jointed: joints one and two deep brownish yellow, remaining joints black, third twice as long as the first

and second taken together. *Thorax* black, covered with fine, short hairs, evenly punctate, parallel lines distinct and reaching half way to the scutellum; parapsidal grooves distinct and reaching three-fourths of the way to the collar; lines over the base of the wings distinct and closely approaching the parapsides anteriorly; scutellum rugose, and with fine short hairs; no foveæ, but a straight, prominent, transverse ridge separates the scutellum from the mesonotum. *Abdomen* clear, semi-translucent brown, but unevenly shaded. *Legs* pale brown, almost yellow. *Wings* heavily, but unevenly clouded, and with a small clear spot in the middle of the radial area; veins heavy, dark brown, almost black; areolet large, distinct; radial area open, or but partially closed. Length: body, .11 inch.; wings, .11 inch.; antennæ, .09 inch.

HOLCASPIS Mayr.

1. *H. duricoria* n. sp.

GALLS.—Globular, but less regularly so than *H. globulus* Fitch; sessile and subclasping on the young branches of *Q. bicolor*. The flattened base and the cone-like form of many of these galls remind one of the Minnie rifle ball. They are often so crowded that they become strangely misshapen; the surface is finely pulverulent, and when dry it is very hard. This suggested the trivial name. Internally the substance is similar to, but much harder than that of *H. globulus*. The larval cell is free in a small, irregular cavity; the galls average one-half inch in diameter, and the oval larval cell is one-eighth by three-sixteenths inches.

They are sometimes found in countless numbers on a single tree and for a single season, and then nearly or quite disappear. A few galls of this species appeared several years ago on a large and thrifty oak (*Q. bicolor*), which is growing in the yard of one of my neighbors. The next year the tree was covered with them; there were bushels of them, but the year following there were few, if any, new galls, but this year they have appeared again in considerable numbers. In this instance, and a few others, I have noticed that the tree seemed to be quite seriously injured by them. It is well known that this species has a large number of parasitic enemies, else it might prove very destructive to this species of oak. It has other foes besides insect parasites.

This is an agamous species, and I flattered myself that the tree in my neighbor's yard would give me an excellent opportunity to study the habits of these female flies as they left the galls, which they do in October and November.

I went day after day to look for them, but found only now and then one on the palings of the fence enclosing the yard. At length

I discovered that several English sparrows and other small birds of different species had taken possession of the tree and were devouring the insects as fast as they appeared. I saw a species of creeper peer into a cluster of galls and seize a fly before it was out of the gall. Of course my effort amounted to nothing, and the mystery around the second generation remains, so far as I know, still unsolved.

That birds peck open galls of various species for the larvæ they contain is well known to every entomologist.

Gall-flies.—Entire body black. *Antennæ* with 13 joints, first joint large, second round, third nearly one-half longer than the two preceding taken together; third to the ninth gradually shorter, and each larger at the apex than at the base. *Thorax* hairy, two parallel lines from the collare to the middle of the mesonotum smooth; median line begins on the border of the scutellum, but soon disappears; parapsidal grooves heavy at their origin on the scutellum, but disappearing before reaching the collare; line above the base of the wings well marked, deepest at the scutellum; scutellum hairy, foveæ wanting. *Wings* slightly smoky, areolet present, cubitus disappearing before reaching the first transverse vein; second transverse heavy, especially at the base of the open radial area. *Legs* very dark brownish red, unguis two toothed. *Abdomen* black, shining, the first segment extremely short, making the second appear sessile on the metathorax; the sides of the second are covered with hairs, but there is a narrow, hairless line on the dorsum; the third and fourth segments are separated by a fine line from each other and from the second. Length: body, .19 inch.; antennæ, .13 inch.; wings, .25 inch.

Though this species has long borne the above name, given by me as a manuscript designation, it has not till now been published. Intending at the time to publish immediately, I sent specimens to several entomologists in this country and Europe; also sent photographs to some of my friends. I had at the time a full description of the gall and fly written, but while holding it to send with other matter for publication a brief notice of a similar gall found in the West appeared in the first volume of the "American Entomologist." Dr. Walsh, who wrote the paper, did not describe the species fully, but said that it was found on the Burr oak, and that it differed in several particulars from *C. globulus* Harris. His brief description led me to think that his and mine might be identical, even though they grew on different species of oak, and I determined to withhold mine till I could settle the question. The death of Dr. Walsh not very long after, and later still the destruction of his collections in the great Chicago fire, has made the settlement of the question difficult, if not impossible. If at any time their identity is established his published name has priority, and I yield to the rule in such cases most cheerfully.

2. *H. corallinus* n. sp.

Galls received from Mrs. E. H. King, of Napa City, Cal. The first lot received were old galls from which the insects had escaped; they were black, but fresh ones are of a fine reddish buff color; they are attached to the small twigs of one of the varieties of dwarf oak and are perfectly round, but the surface is irregularly and thickly studded all over with short, stumpy projections which differ in size, and that are as large or even larger at the summit than at the base. There is usually a slight depression at the end. These remind one of certain species of coral. The surface, projections and all, is covered with a hard, close, velvety pubescence, if anything so closely appressed can be called velvety; the single larval cell is not free; the substance of the gall bright shining yellowish brown; the size is nearly three-fourths of an inch in diameter. The size and the blunt horns remind one of *A. speciosus* Bass., but that species is smooth, and the galls are found on the leaves only.

The insects from which the following description was made were cut from the galls from which they had nearly eaten their way out; they are all females.

Gall-flies.—Entire body, except a small spot on the dorsal ridge of the abdomen, thickly covered with short silvery white hairs, those of the antennæ and the middle of the pleuræ shorter and less conspicuous. Color, except the brownish black antennæ, reddish brown. *Head* a shade lighter than the thorax, which is itself less dark than the abdomen. *Antennæ*: first joint of the 14-jointed antennæ oblong-oval and only a little darker than the head; second joint very small and round, third one-fourth longer than the two preceding taken together, fourth a little longer than the first and second; remaining ones gradually shorter to the last, which is twice as long as the thirteenth; it has an indistinct annulation, which might be taken for a true joint. Lines on the *mesothorax* darker than the general surface; two closely contiguous, smooth, parallel lines from the collare half way to the scutellum; parapsidal grooves very widely separated at their origin on the scutellum, shallow and almost hidden by the appressed hairs and wholly disappearing before reaching the middle of the mesonotum; *scutellum* rounded, foveæ wanting. *Abdomen* more densely hairy than any other part of the body and the hairiness extends to all the joints that are visible. Color of the *legs* somewhat lighter than the body; unguis one toothed. *Wings* hairy, veins dark, but not heavy; areolet small, cubitus not quite reaching the first transverse; radial area open, basal vein angulated. Length: body, .16 inch.; wings, .18 inch.; antennæ, .10 inch.

3. *H. canescens* n. sp.

On one of the oak branches sent by Mrs. King, which bore several galls of *H. corallinus* just described, was a short branchlet on which were four or five galls of another species.

The fully grown galls are round and measure three-eighths of an inch in diameter, and each has a short, blunt spur at the apex precisely like that of *H. duricoria* Bass., and they might easily be taken for dwarf specimens of that species, though the surface is more hoary. The larval cell is, in these specimens, attached to the gall, but can be detached without breaking. The body of the gall is hard, and around the cell there is a thin even layer of rusty brown, and outside this a light gray color prevails.

Opening three of the galls I found in each a full grown female gall fly that had failed to make its way through the hard wall enclosing it.

The description of *H. corallinus*, just given, applies to this species, except as follows:

The thorax and legs are somewhat darker and less hirsute, and the latter are of a clear, shining, almost resinous appearance. The abdomen is black and shining, with a tinge of brown, and the hairiness is confined to the sides of the second, third and fourth segments, and is so very sparse, short and fine, as to escape observation unless highly magnified, while the hirsuteness of *H. corallinus* gives it a hoary appearance even to the naked eye. The parallel lines on the mesothorax are more widely separated, and these with the line over the base of each wing are darker, broader and more shining, and, by contrast with the general surface, appear black. The parapsidal grooves, inconspicuous in *H. corallinus* are still more so in this and would easily escape notice. The wings differ mainly in the radial area, which is much larger in this species. Length: body, .15 inch.; wings, .20 inch.; antennæ, .13 inch.

4. *H. Sileri* n. sp.

Galls ovate from a broad base, sessile on the twigs of an oak growing in southern Utah, sometimes elongated at the point but not beaked, shining brown, yet not quite smooth. Many specimens are deeply and irregularly cracked, and from some the epidermis has flaked off. They rarely exceed one-fourth of an inch in diameter, and many are a little less than that. Internally they are harder than *H. duricoria*, *H. globulus* and *H. rugosus*, which they resemble, except that they are smaller. The larval cell is closely imbedded, but separable from the gall.

I have reared no gall-flies from these, but have found, on cutting some of them open, several apparently mature female specimens.

Gall-flies.—Dull dusky, reddish brown, except the abdomen, which is black and shining. Antennæ 14-jointed, first short, second very small, third and fourth moderately long and equal, the remaining gradually shorter, except the last, which is one-third longer than the preceding. Entire thorax moderately hairy, parapsidal grooves from the scutellum half way to the collare diverging; parallel lines from collare a little more than half way to the scutellum distinct and smooth

a very deep line over the base of each wing and a short median line from the scutellum, which does not reach forward to the parallel lines just mentioned; foveæ wanting. *Abdomen* black, the second segment with hairs on the sides. *Legs* dark reddish brown, the tarsi darker and rather dusky, unguis two toothed. *Wings* large, hyaline; veins slender, dark; areolet small, cubitus only reaching two-thirds the way to the first transverse, radial area open and of usual size.

I do not give measurements of this species as the flies were not naturally developed, but they are probably about the same size as *H. corallinus* and *H. canescens*. The naturally hatched insects may vary somewhat from this description, but the galls are sufficiently distinct to establish this as a new species. I give it the name of the discoverer, A. H. Siler.

5. ***H. perniciosus*** n. sp.

Monothalamous, roundish galls, sessile by a broad base on the twigs of a dwarf oak growing in southern Utah. Apex in some specimens slightly elongated and compressed laterally, but usually blunt cone shaped. The twig itself is enlarged into a shallow cup-like receptacle at the base of the gall. In all my specimens (dry ones from which the insects have escaped) the galls are smooth, or only slightly rough, and with deep, irregular cracks and a dark reddish brown color. The large larval cell is firmly imbedded in the rather hard cellular tissue. The insects escape through a large opening which they make near the base of the gall. These galls bear a pretty close resemblance to the parasitized galls of *H. duricoria* Bass. Judging from their abundance on the twigs sent me they must be quite injurious to the trees infested. Cutting open several of the unperforated galls, I was so fortunate as to find several dead, but perfectly developed gall-flies, all females.

Gall-flies.—*Head* deep dusky red, face dark, almost black in the centre; vertex with a broad dark band in the middle enclosing the ocelli and extending to the base of the antennæ. *Antennæ* brownish black, shining; first joint large, second ovate, third slender and a little longer than the first two taken together, fourth, fifth, sixth and seventh gradually shorter, remaining joints of uniform length. *Thorax* dark reddish brown; in a strong light appearing black and covered with white hairs; surface punctulate, parallel lines broad, reaching half way to the scutellum; median line very fine and indistinct, parapsidal grooves distinct on the scutellum, but disappearing half way to the collare. Lines over the base of the wings distinct, close to and parallel with the parapsidal grooves; scutellum light red, hairy, regularly rounded posteriorly, foveæ wanting. *Abdomen* black and shining, first segment large, the sides sparsely covered with rather long, white hairs; sheath of the ovipositor with fine short hairs. *Legs* dark reddish brown, paler at the joints, the unguis black, simple. *Wings* hyaline, veins dark reddish brown, shining; areolet rather large, distinct; cubitus slender, and disappearing half way to the first transverse, radial area open. Length: body, .14 inch.; wings and antennæ medium length, not measured.

DRYOPHANTA Forster.**1. D. Clarkei** n. sp.

GALLS.—Small, round, smooth, and not quite three-sixteenths of an inch in diameter. They are formed of the buds of the white oak, and are filled with larvæ, which are separated from each other by very thin, filmy walls. Most of those in my collection are transformed terminal buds, but a few are axillary. I have not learned whether their development takes place wholly in the spring, or whether, like several other vernal species, they are partially developed in the preceding year.

The insects, which appear early in the spring, are of both sexes, and are described as follows:

Gall-flies.—Females.—*Head* and entire thorax black and shining; antennæ with thirteen joints, first short, dark, shining, almost black; second lighter color, short, almost spherical; third short, but nearly as long as the first two taken together; this and the following three light yellowish brown; remaining joints short and dusky brown. *Thorax* perfectly smooth, parapsidal grooves heavy, as are also the lines over the base of the wings; polished and shining. Scutellum also smooth, foveæ very small. *Legs* dark, shining brown, paler at the joints. *Wings* hyaline, veins moderately heavy, areolet a mere point; cubitus pale, decreasing in size as it approaches the first transverse, which it does not quite reach; radial area open. *Abdomen* black, short, terminal segments mostly concealed in the second.

Male.—Antennæ with fifteen joints, first black, second globular, third rather short, curved and incised; legs lighter than those of the female; abdomen very small; in size the sexes vary little. Length .08 inch.; wings, .09 inch.

This fine species was sent me last spring by Miss Cora A. Clarke, from eastern Massachusetts.

2. D. pumiliventris n. sp.

I find this remarkable species among my unnamed galls where it has lain for many years. I know nothing of its history further than the description of the galls and insects here given.

I have received through the mails many boxes of galls that bore no clue to the source from whence they came, or even to the tree or plant on which they grew. Most of them were well-known species, and their source was of comparatively small importance. I think this species must have come in this way.

These galls, now shrunken and distorted, are probably green, soft and succulent when fresh. They grow in clusters in the axils of the leaves, and when fresh may have been as large as a chestnut or a hazel nut. They seem to have varied considerably in size and form.

They are polythalamous, and there are no true larval cells that I can discover. The species of oak on which they grew, for it was undoubtedly an oak, is not known. But while a good description of the galls is impossible from the material I have in hand; the insects possess very marked specific characters. I have forty-seven specimens of this species, and, strange to say, they are all males! They are described as follows:

Gall-flies.—*Head* yellowish brown to dark yellowish brown; vertex is somewhat rugose, ocelli very pale yellow; antennæ somewhat darker than the head, 15-jointed, the first and second of moderate length, the third very long, slightly curved and incised, the remaining joints long and all very slender; the cheeks are grooved; the thorax, and, indeed, the whole body, shining yellowish brown, but varying considerably in intensity in different parts and also in the same parts in different specimens. *Thorax* narrow and elevated in the middle, and with deep parapsidal grooves that converge towards the scutellum; pleuræ darker than the mesonotum and less shining; scutellum finely rugose, opaque, foveæ small, smooth, shining and widely separated. *Legs* reddish rather than yellowish brown, and nearly uniform in color. *Abdomen*: first segment very long, slender and arcuate, like the first segment in most of the petiolated Braconidæ; second segment very small, triangular, the acute angle joined to the first segment, compressed laterally, and, small as it is, almost or quite covering the remaining segments; it is smooth and shining, and in some specimens the dorsal portion is indented, though this may be accidental. *Wings* very large, hyaline, the veins not heavy and rather pale; areolet small, but distinct, the second transverse vein bent in the base of the radial area, but without the stump of a vein; radial area open, long, but of medium width; cubitus very slender and nearly colorless. Length: body, .12 inch.; abdomen, .05 inch.; wings .20 inch.; antennæ, .20 inch.

The pale ocelli, the extremely long antennæ, the large wings, the long pedicel, and the extremely small remaining segments of the abdomen, all these taken together mark this as a very distinct species that, when its history is better known, may form the type of a new genus.

3. ***D. eburuens*** n. sp.

GALLS round, smooth, polished, resembling old ivory. They are from one-eighth to three-sixteenths of an inch in diameter, growing in great numbers on both the upper and under surface of oak leaves of a species I have not yet determined. The galls were sent me by A. H. Siler from southern Utah. Sometimes the galls are so crowded that they lose their globular form. They are strongly attached to the leaves and the base of the gall is usually grooved by the vein on which it grows. There are often twenty or thirty galls on a single leaf, one-third of which will be on the underside. They are hard

and rather thick shelled and filled with fine silvery white hairs that radiate from the single larval cell that is attached to the base of the gall.

From several thousand galls I have reared less than fifty gall-flies. These are all females, and are described as follows:

Gall-flies.—*Head* black, face and vertex finely punctate, and with a few microscopic hairs; antennæ stout, fourteen joints, first thick, second less thick and only two-thirds as long, third fully as long as the two preceding taken together, fourth one-half as long as the third, the remaining ones short, all black and with short, inconspicuous hairs. *Thorax* black, mesonotum polished and shining, except the very distinct parapsidal grooves and a small hairy spot in front of the base of each wing; scutellum opaque, rough, foveæ present, rough like the rest of the scutellum. *Abdomen* bright, shining black. *Legs* black, with very dark, brownish red joints, the whole having, in a certain light, a reddish hue; unguis simple. *Wings* large, hyaline; veins slender, the areolet very small, the cubitus colorless the entire length, the radial area long, open and quite narrow. Length: body, .10 inch.; antennæ, .10 inch.; wings, .18 inch.

4. **D. similis** n. sp.

Galls received from Mr. Siler and collected by him in southern Utah. They are in all respects, save color, like those of *A. eburneus* Bass., but the color is a shining brownish buff. They are found on a different species (or variety) of oak.

The gall-flies also resemble *A. eburneus*, but are much smaller, the body being only .08 inch., the wings .12 inch. and the antennæ .07 inch. in length, and the cubital vein in the lower half is subobsolete.

A large number of specimens may show this to be only a variety, but the difference in the length of the wings and the antennæ, if constant, seems too great to be merely varietal. There may be seasonal differences, but as to this I am not informed.

5. **D. corrugis** n. sp.

Among a hundred or more of gall-flies captured last spring, while in the act of ovipositing in the buds of several species of oaks, were several distinct species, and one of these taken from the buds of *Q. prinoides*, produced, so far as my observations went, no galls whatever, none being found in any of the several visits I made these bushes during the summer.

Since the discovery, last spring, by Miss Cora A. Clarke of two new species,—*Andricus Clarkei* and *A. pulchra*, and of *Neuroterus pallidus* by myself, all on the aments of different species of oak, I have come to the conclusion that the insects in question are the agamous females of another bisexual species that comes from galls on

the sterile flowers of *Q. prinoides*, and that I failed to find the galls simply because I did not revisit the trees until the flowers had fallen off. Of course this cannot be ascertained till next spring, and possibly not then, but meantime I name and describe this very pretty little species, of which I have sixteen individuals.

Gall-flies.—*Head* black, and with extremely fine reticulations; antennæ with fourteen joints, first heavy, club shaped; second thicker than the first and almost equal in length, third two-thirds as long as the first two and extremely slender, fourth short and slender; all these light yellowish brown, fifth yellowish to dark brown at the tip, a little thicker than the fourth, remaining joints very dark brown, very short and thick, the thirteenth and fourteenth separated by an indistinct articulation, and the thirteenth not so dark brown as the preceding. *Thorax* narrow, smooth and shining, parallel lines present, parapsidal grooves narrow, not shining; all these are quite slender; general surface of the mesonotum finely, evenly and very beautifully transversely wrinkled; scutellum rather large, more finely wrinkled than the mesonotum and less shining, foveæ wanting. *Abdomen* black, polished, subdepressed, second segment rather long, third one-half as long as the second, others concealed in the dry specimens. *Legs*: femur and tibia dark brown, except the joints, which, with the coxæ and tarsi, are yellowish brown, unguis simple. *Wings* hyaline, veins pale yellow, almost colorless; areolet absent, and the cubitus so indistinct as to be traced with difficulty even half way to the first transverse; radial area large, open; second transverse does not reach quite to the anterior edge of the wing and posteriorly extends no further than the point where the areolet is found in most species. Length: body, .10 inch.; wings .10 inch.; antennæ, .08 inch.

6. *D. pedunculata* n. sp.

Galls growing on slender peduncles on the edge of the leaves of *Q. rubra* and *Q. coccinea*. The peduncles are from one-fourth to one-half an inch in length and are plainly the prolongation of lateral leaf veins. They are usually flattened, and in some cases bordered on one side for nearly the whole length with a very narrow extension of the leaf blade itself. When dry they are often twisted like the stems of the moss *Funaria hygrometrica*. The gall is ovate, with a long, curved point. It measures one-eighth by three-sixteenths of an inch exclusive of the tip. When fresh it is smooth, and has a somewhat glaucous hue, which mostly disappears in drying, changing to a dark, dirty olive-brown. It is extremely thin, and is hollow, except the free, smooth, oval larval cell. This cell is .05 by .10 of an inch, and is extremely fragile.

This gall differs from *Andricus capsula* Bass. in size, being much larger, and in shape the latter being as long, but only half as thick, and also in color, which in either species is constant. But the free larval cell in *D. pedunculata*, and its entire absence in *A. capsula* is the most striking difference.

Gall-flies.—*Head* black, vertex minutely rugulose; antennæ 14-jointed, first and second equal, and very pale yellow, third a little longer than the two preceding, slender; fourth equal to the first and second, the fourth brownish at the tip, and the remaining joints dark brown, and of equal length. *Thorax* smooth (microscopically punctate) black, shining, parallel lines obscure, parapsides distinct, but slender; scutellum small, obscurely punctate, foveæ very small and indistinct. *Abdomen* bright shining black, second segment very large, others (in dry specimens) concealed by the second. *Legs* yellowish brown, middle of the femur darker; claws simple. *Wings* hyaline, veins slender, dull brownish yellow; areolet small, cubitus reaching nearly to the first transverse, radial area long, open. Length: body, .08 inch.; .11 inch.; antennæ, .07 inch.

Male.—Antennæ 15-jointed, first joint dark at the base, second yellow, globular; base of the third, yellow; tip thickened, and with the remaining dusky brown; head, thorax and abdomen black; legs slightly darker than the female; abdomen small. Length: body, .09 inch.; .11 inch.; antennæ, .09 inch.

ANDRICUS Hartig (subgenus **CALLIRHYTIS**).

1. A. (*Callirhytis*) *pulehra* n. sp.

Galls on the aments of *Q. tinctoria* (also *Q. rubra*), when dry, shrunken and shrivelled, and measuring from .10 to .15 of an inch in diameter. They are polythalamous, each gall producing four or five insects. The interior of the gall is of a very loose spongy texture and the outside, thin and papery and green like the leaves. When fresh they are round and the size of a common red currant. They differ from the galls of *Dryophanta palustris* O. S., which is sometimes found on the aments of *Q. ilicifolia*, in the thin and smooth shell, and in being polythalamous. Flies of both sexes, appearing in May.

Gall-flies.—**Female.**—*Head* and thorax black, and evenly punctate, except the scutellum, which is evenly rugose; antennæ 14-jointed, the first short, thick; the second short, oval; third slender, one-fourth longer than the two preceding taken together, remaining gradually shorter; all connate, but alike distinct, and with a yellowish almost, metallic hue; cheeks grooved. Collare very broad; mesothorax rounded, median line a slight depression, but punctate like the rest of the surface, parallel lines rather broad and shallow, polished; parapsidal furrows very fine and extending throughout; lines over the base of the wings present, but indistinct; scutellum evenly rugose, foveæ near together and rather deep, and ovally elongated. *Legs* very dark brown, joints a shade lighter, unguis simple. *Wings* hyaline, veins colorless, except the subcostal and transverse, which are dark, but not black; areolet wanting, radial area open. Length: body, .08 inch.; wings, .08 inch.; antennæ, .07 inch.

Male.—Antennæ 15-jointed; first short, black; second short, ovate; third longer than the first two, and slightly curved and incised; all, except the first, with the yellowish metallic hue noticed in the female. *Abdomen* very small. *Legs* several shades lighter than those of the female, the posterior pair darkest; the somewhat longer antennæ and the smaller abdomen are usual in this sex, and, except as above, the two are quite alike.

About one-half of my fifty or sixty specimens are males.

Galls received from Miss Cora A. Clarke, Jamaica Plain, Mass. I have galls, probably identical, which I found on the aments of the red oak many years ago in Florida, Mass., but I did not succeed in rearing insects from them.

2. **A. (*Callirhytis*) *pusulatoides*** n. sp.

Blister-like galls on the points of the acute lobes of the leaves of *Q. coccinea*, each tipped with the long hair-like point that terminates each lobe. They are ovate-acuminate, and look as if a bubble of air had separated the upper and under lamina of the leaf. They are about one-third by one-fifth of an inch in diameter, sometimes a little depressed vertically. The walls are very thin, the color the same as the leaf. Each contains a free, oblong-oval, thin walled larval cell, whose length is fully twice its diameter. The free larval cell of *Dryophanta palustris*, the only species with which this can be confounded, is perfectly round, and the gall is larger, thicker, and rarely found in the same position.

Gall-flies.--Female.--Entire body shining black. *Head* small; antennæ 14-jointed; first, second and third yellowish brown, remaining changing gradually to dull, dusky brown; first and second joints short, third equal to the preceding, the rest of uniform length. *Thorax* smooth, median line heavy on the scutellum, short; parapsidal grooves very distinct, converging closely on the scutellum; scutellum finely and evenly rugose, foveæ distinct, longer than broad, not deep. *Abdomen* polished, second segment large, deep, and nearly concealing the remaining ones. *Legs*: trochanters black, or dark brown, the remaining joints clear, dark brownish yellow, the posterior pair darkest, ungues simple. *Wings* of moderate size, subfuscous, veins strong and distinct, areolet wanting, the cubitus reaches a little more than half way to the first transverse vein; radial area open, and the veins bounding it of equal size throughout. Length: body, .10 inch.; wings, .10 inch.; antennæ, .08 inch.

This is not a common species, though I have met with a few individuals nearly every year for many years past. They are the prey of parasites to such an extent that I have never reared more than two or three true gall-flies, and I have now but a single female fly, of whose identity I am sure, and from which the above description is made.

3. **A. (*Callirhytis*) *reticulata*** n. sp.

Polythalamous galls on the midvein and near the base of small oak leaves from what is probably one of the dwarf varieties of *Q. virens*. Prominent on both surfaces, but more so on the underside. They are almost round and (dried specimens) one-fourth of an inch

in diameter. The dry galls are exceedingly hard, and they bear a very close resemblance to those of *A. cicatricula*, though the scar or indentation invariably found in that species is wanting. The larval cells are not separable from the solid woody fibre around them, and they all radiate from a common centre.

My galls, collected by Mr. Howerton in New Mexico, have produced no males, but I do not look upon this as an agamous species.

Gall-flies.—Female.—*Head* and thorax very dark, brownish red, approaching black; antennæ short, 13-jointed, the first and second joints rather small and short, third hardly longer than the two preceding taken together, fourth not quite as long as the third, fifth to the twelfth subequal, thirteenth one-fourth longer and showing in a favorable light a dark ring near the tip hardly distinct enough to be called a suture; mesothorax with an exceedingly fine reticulation and a few short, scattered hairs, parallel lines reach half way from the collare to the scutellum, these and the parapsidal grooves and the short lines over the base of the wings are present, but very narrow; scutellum rather long, pointed, finely rugose, but foveæ large, shallow and smooth. *Abdomen* shining yellowish brown, lightest anteriorly, second segment very long and deep, and nearly concealing the remaining ones. *Legs* light yellowish brown, except the posterior pair, which are much darker; unguis simple. *Wings* hyaline, veins slender and mostly colorless, areolet present, but indistinct, radial area open. Length: body, .10 inch.; wings, .12 inch.; antennæ, .08 inch.

4. *A. (Callirhytis) ruginosus* n. sp.

GALL.—A hard, round knot, nearly an inch in diameter, near the tip of a slender twig of *Q. (virens?)* The surface rough and blackened and deeply and irregularly fissured, probably by drying, with several holes made by the escaping insects. Polythalamous, the walls of the numerous larval cells not separable from the firm, but rather open cellular tissues around them. This gall resembles those of *A. Suttonii*, but is much more rough, and is entirely destitute of woody fibre.

Sent me by Mr. Howerton from New Mexico. Five gall-flies reared; all females.

Gall-flies.—*Head* black, very broad behind the eyes, breadth twice its depth, vertex rugose; antennæ long, slender, yellowish brown to dusky towards the end, fourteen joints, first abruptly clavate, second not thicker in the middle than at the ends and nearly as long as the first; third one-half longer than the two preceding; fourth to the eighth gradually shorter, remainder equal. *Thorax* black, mesonotum roughly pitted and wrinkled, and more deeply posteriorly; a few short, white hairs towards the scutellum; median line reaches half way to the collare, and two parallel lines half way to the scutellum; parapsidal grooves entire; these and the lines over the base of the wings present, but quite obscure; scutellum very roughly pitted and wrinkled, two large, rough pits (foveæ) at the base, and a smaller intermediate one. *Abdomen* smooth, shining,

light yellowish brown, slightly darker in the middle of the very large second segment, others narrow. *Legs* dark brownish red, unguis simple. *Wings* large, hyaline; veins slender, yellowish brown; areolet not large, but distinct; cubitus fading out close to the first transverse, but not touching it; second transverse bent, but not angulated at the base of the broad, open radial area. Length: body, .13 inch.; wings, .16 inch.; antennæ, .13 inch.

5. **A. (*Callirhytis*) *saccharinus*** n. sp.

Small, hemispherical, pouch-like galls, attached by their full diameter to the underside of the leaves of *Q. coccinea*, the largest not more than three-sixteenths of an inch through. An ordinary ring net for catching insects will give a good idea of the form of this gall as seen on the underside of the leaf. The flat upper surface is formed of the upper lamina of the leaf and is sometimes slightly depressed below and rarely raised above the general surface of the leaf. It appears on this side as a circular scar whose outline equals the diameter of the gall. The gall walls are green like the leaf, and extremely thin, and in each there is a free, oval larval cell like that of *A. pusulatoides* described in this paper, except that it is a short oval, while the other is very long. I was inclined to consider these two as identical, but an examination of the only fly, a male, that I have reared from these galls; their shape, and the larval cell, and the position of the galls on the leaves show it to be a distinct species. I have a number of the galls, and each contains the empty larval cell, showing that my specimens were gathered too late.

Gall-flies.—*Head* black, vertex rugose, face hairy with white hairs; antennæ longer than the body, fifteen joints, color reddish brown at the base to dusky brown at the tip, first short, cup-shaped, second very short, globular, third twice as long as the first and second, fourth and remaining ones one-half as long as the third. *Thorax* black, mesothorax coarsely and unevenly wrinkled, two closely contiguous parallel lines reach nearly half way to the scutellum, parapsidal grooves entire, but rather obscure anteriorly; lines over the base of the wings distinct, and anteriorly nearly uniting with the parapsidal grooves; scutellum very roughly wrinkled, small; foveæ small. *Abdomen* small, shining black. *Legs*: posterior pair dark reddish brown, lighter at the joints; anterior pairs lighter, unguis simple. *Wings* medium size, slightly fuscous, veins dark smoky brown, all uniformly colored, areolet very small, but very distinct; cubitus slender towards the first transverse, but touching it; radial area open and rather broad. Length: body, .10 inch.; wings, .11 inch.; antennæ, .13 inch.

One male specimen from Connecticut.

6. **A. (*Callirhytis*) *seminosus*** n. sp.

GALLS.—Hard, woody knots, sometimes terminating the shoots in a clump of oak sprouts (*Q. castanea*?), but oftener an enlargement of the base of the small lateral branches. In my specimens the ter-

minial galls are an inch in diameter and shaped like a strawberry. The others are about half as large, and of the same shape. All are more or less uneven on the surface. These are all old galls and the outer bark has mostly fallen off, and the entire surface is dotted as thickly as possible with very small, open larval cells. The larger galls must contain, each, several hundreds of these tenantless cells. The cells are distinct from the woody fibre in which they are imbedded, but cannot be separated from it. The galls are easily taken for those of *A. scitula* Bass. and such I took them to be until I found that the insects were very different. *A. seminosus* is a much smaller insect than *A. scitula*.

Opening some of the galls I found several gall-flies, but not one of them is perfect in all its parts. I have the abdomen of one, the thorax, legs and imperfect wings of another, and the head and antennæ of still others, and from these I gather the following characters:

Gall-flies all females.—*Head* black; antennæ short, dark honey-yellow, fourteen joints, the first and third equal; from the fourth to the thirteenth very short, the thickness even exceeding the length, the fourteenth longer and cone-shaped; mesonotum black, finely punctate, not hairy, the parapsidal and interparapsidal parallel lines exist as faint, hardly discernible depressions; the dorsal or median line indistinct, but extending more than half way to the collare; a short, deep depression over the base of each wing; scutellum shining, but irregularly and coarsely wrinkled. The shining foveæ are very deep and separated by an unusually high, narrow ridge. *Abdomen* black and shining, except the posterior margins of the terminal segments, which are yellowish brown. *Legs* dark reddish brown, unguis simple. *Wings* so crumpled that a good description cannot be had, though the veins are faint and the areolet snobsolete. Length of the body .10 inch.

It differs particularly from *A. scitula*, the only species that it can be taken for, in having very large, deep, shining foveæ, while *A. scitula* has none, and in the fourteen antennal joints and the coarsely wrinkled scutellum.

I collected the galls in Rockport, Ohio.

7. **A. (*Callirhytis*) *pilula*** n. sp.

Small, round, thin-shelled galls on the blade of the leaves of *Q. undulata*, collected in southern Utah by Mr. Siler. They are usually situated near the margin of the leaves and always on one of the principal leaf veins, and project equally above and below the surface. The average size is only .15 of an inch in diameter. The galls resemble those of *Neuroterus utricula* Bass. more nearly than any other species known to me.

I found twenty-five or thirty specimens in a box of *A. Sileri*, and was so fortunate as to find two of them that, though perforated, still contained the gall-flies. These were both females, quite perfect, and the description that follows will, no doubt, well agree with more recent specimens.

Gall-flies.—*Head* black; antennæ yellowish brown, fourteen joints, the first club-shaped, second nearly as thick as long, third equal to the two preceding in length, remaining ones gradually shorter to the last two, which appear as one, except in a very favorable light; they are, together, longer than the two preceding. *Thorax* shining, punctate, parapsidal grooves reach from the collar to the scutellum and converge posteriorly; median line reaching from the collar to the scutellum; fine and even throughout, on the middle of the mesonotum and between the median line and the parapsidal grooves two short longitudinal depressions; scutellum moderately rugose, foveæ large, shallow and widely separated. *Abdomen* shining black, except the clear, brown edges of the segments; second segment, the sides, etc., with a small, densely hairy spot, that looks like frost; sheath of the ovipositor extends slightly above the dorsum. *Legs* reddish brown, lightest at the joints, unguis simple. *Wings* hyaline, veins not heavy, reddish brown, areolet wanting; radial area open, but the second transverse turns upward a short distance along the margin of the wing as in the inquilines, but stops abruptly without closing the area. Length of the body .11 inch.

This species, in the prolongation of the sheath of the ovipositor, the partial closing of the radial area and the obsolete areolet, shows an approach towards characters seen in the inquilines, and that distinguish them from the true gall-making Cynipidæ; still, there are other characters that make it certain that this is a true gall maker.

8. ***Andricus ? Mexicana*** n. sp. (galls only)

"Mountain near Guadalajara, Mexico; on the only large leaved oak that grows there." This is all I know of this species, except what I learn from the gall itself. I do not know who collected it, nor to whom I am indebted for the fine specimens that came to me in a chip-box a year or two ago. I suspect that my friend, B. Pickman Mann, sent them, and that they came from Dr. Palmer's collection.

I have no insects reared from these galls, but they are probably produced by an *Andricus*. They are the largest woolly leaf gall known to me, measuring more than an inch and a half by an inch in length and breadth, and more than three-fourths of an inch in thickness. The color is a rusty yellowish brown. On removing the long and exceedingly thick, woolly covering from the nucleus, I found several openings, through which the insects had escaped. The nucleus is rather hard, and has, internally, a vitrified or crystalline appearance.

The larvæ are imbedded in this and have no larval cell separable from it. The galls are sessile on the midvein, on the upper surface of the leaf, and the point of attachment extends along the vein one-fourth of an inch.

The leaves of the oak are very large, measuring more than six inches in width, and the species is probably *Q. crassifolia*, at least the leaves agree with the description and illustration of this species as given in Humboldt and Bonpland's "*Plantes Equinoctiales*."

9. **D. (Callirhytes) Clarkei** n. sp.

Small, black polythalamous galls. The sterile flowers of *Q. ilicifolia* transformed into galls in such countless numbers as to make the aments look like elongated blackberries. The largest gall I have found measured .11 of an inch in diameter and contained four larval cavities. Most of them are considerably smaller, having from one to three cavities, and measuring from .05 to .08 inch.

Small as these galls are, and short and early as their season is, at least two-thirds of them contain at this writing (November, 1889) living parasitic larvæ. In most cases nearly every flower has been transformed into a gall, though in a few the galls are sparingly intermixed with the flowers.

At the time the galls were received, early last spring, no flies had made their appearance, but they came out in considerable numbers during the month of May. They are all females, and are described as follows:

Gall-flies.—*Head*, thorax and legs very dark brownish red. The head minutely punctate; antennæ thirteen jointed, first joint club-shaped, second very short, oval, third slender and a very little longer than the two preceding; fourth, and remaining, to the eleventh gradually shorter; the twelfth and thirteenth so closely connate as to appear as one very long joint, the suture only visible in a favorable light, the thirteenth joint long, and with a false suture close to the end; mesothorax finely punctate; two short, parallel lines from the collare, a very short median line from the scutellum, parapsidal grooves extending from the collare to the scutellum and moderately converging on the latter; line over the base of each wing, all these present, but less prominent than usual; scutellum rugose, foveæ present, but very small. *Abdomen* dark, shining, second segment very long and covering the terminal ones in most dry specimens. *Legs* more dusky red, and tarsi paler than the parts above, ungues black, one-toothed. *Wings* hyaline, veins almost entirely colorless; areolet absent, the cubitus sub-obsolete, radial area open, the second transverse vein ends abruptly before reaching the margin of the wing. Length: body, .07 inch.; wings, .08 inch.; antennæ, .06 inch.

From Miss Cora A. Clarke, Jamaica Plain, Mass.

ANDRICUS Hartig.1. **A. cicatricula** Bassett.

Cynips cicatricula (gall) Bassett, Can. Ent. xiii, p. 101.

I described the gall of this species in 1882 and published it in the "Canadian Entomologist" of that year, but found that the gall-flies, of which I had reared a large number, were ruined by dampness. I here republish the description of the gall and add a description of the gall-flies.

"Polythalamous galls on the midvein of the leaves of *Quercus alba* never more than one on a leaf, and situated sometimes at the base, but usually from one-fourth to one-half way from the base, rarely above the middle. They project one-third below and two-thirds above the surface of the leaf; they are rounded on the under and cone-shaped on the upper surface of the leaf. The gall is solid and somewhat fibrous, and in its shorter diameter measures about one-half inch, and in the longer from five- to seven-eighths of an inch. The larval cells radiate in all directions from the centre of the gall and are quite numerous. There is, at or near the summit of the cone, a small scar or indentation, which is always present, and so characteristic as to suggest the name I have given to the species."

Gall-flies.—Male.—*Head* black, vertex microscopically reticulated; antennæ long, with fifteen distinct joints, first and second dark reddish brown, remainder light, shining yellowish brown, first joint short, heavy, second short, ovoid: third one-fourth longer than the first two, slightly curved, but scarcely incised; fourth to the fourteenth subequal and each as long as the first and second taken together, last short, cone-shaped. *Thorax* black, shining; mesothorax rounded and with regular transverse reticulations; two short, faint parallel lines; parapsidal grooves entire, slender and almost parallel, but slightly convergent towards the scutellum; scutellum finely rugose, foveæ large, shining. *Abdomen* small, the first segment longer and more plainly seen than usual, second very long, nearly round, polished, black, only the edge of the remaining ones visible. *Legs*: posterior pair dark brown with pale joints, the anterior pairs light reddish brown, unguis two-toothed. *Wings* hyaline, veins slender, first and second transverse and the submarginal brown, the rest nearly or quite colorless; areolet small, distinct; cubitus disappearing half way to the first transverse, radial area open and of medium width. Length: body, .07 inch.; wings, .10 inch.; antennæ, .08 inch.

Female.—*Head* and thorax as in the male; antennæ with thirteen joints of a clear light brown color, growing somewhat dusky in the last few joints. *Abdomen* shining black, except the venter, which is a clear translucent brown; second segment long, broad; sheath of the ovipositor extends above the dorsum as in *A. operator* O. S., and in all the species that belong to the inquiline genus *Ceroptes*. *Legs* all dark reddish brown. *Wings* as in the male. Length: body, .10 inch.; wings, .12 inch.; antennæ, .07 inch.

Connecticut.

2. **A. speciosus** n. sp.

I have not been able to determine the species of oak which produces these galls. They were sent me by Mrs. E. H. King, of Napa City, Cal.

Globular galls growing on the underside of oak leaves (I have one leaf with a gall on the upperside). The largest specimens are three-fourths of an inch in diameter and the smallest less than half that size. The galls of ordinary size are covered with short, blunt horns to the number of fifty or sixty, while the smallest have as few as ten or twenty. The entire gall is, when fully matured, of a delicate pink color, though in some of the smaller specimens this is almost wanting. The walls of the galls are thick, of a shining crystalline character, enclosing a scarcely separable larval cell, and showing traces of pink lines beneath the surface.

Both galls and gall-flies are among the most beautiful I have ever seen. The insects that I have (fifteen in number) were all cut out of the galls, but were living at the time, and continued alive for several days.

They probably live in the galls through the winter, and, as they are all females, they belong to the class of agamous species.

Gall-flies.—*Head* dark brownish red, cheeks with a broad furrow; antennae black, short, with fourteen joints, the first and second subequal, the third one-fourth longer than the first two taken together, the fourth equal to the first two, the fifth, sixth and seventh gradually shorter, the seventh to the fourteenth very short, all somewhat hairy. *Thorax* black, and rather sparsely covered with microscopic hairs; the surface presents an extremely fine crackled appearance; two broad and smooth parallel lines from the collare half way to the scutellum; parapsidal grooves deep and rapidly converging towards the scutellum and the furrows over the base of the wings deep and *uniting with the parapsides before the latter reach the collare*; scutellum dull black from the light hairs, and the moderately rugose surface; foveae large, and, like the rest of the surface, rugose. *Legs* black and shining beneath the sparse, short, white hairs; unguis two-toothed. *Abdomen* small, shining, black with the sheath of the ovipositor shading from dark to light amber, and a few microscopic hairs on the anterior half of the second segment. *Wings* clear, with minute hairs; veins clear, dark brown, almost black; areolet present, but very small; cubitus slender and of uniform size throughout, second transverse with an angle in the base of the short, broad and open radial area, *a bright red spot in the centre of the lower half of the marginal and the submarginal cells*; that in the marginal the brightest. Length: body, .12 inch.; wings, .16 inch.; antennae, .10 inch.

3. **A. ? indistinctus** n. sp.

Small, round galls attached by a broad base to the small twigs of *Q. alba*. Smooth when fresh, but the dry galls are wrinkled and

closely resemble pepper corns. The diameter of fresh galls is about three-sixteenths, while the dry ones are about one-eighth of an inch. They contain no true larval cell, separable from the gall walls, which are thin and of a loose texture. They are monothalamous, and the insects were nearly mature in October when they were gathered and came out before the next spring. Their coming out was probably hastened by the warmth of the room in which they were kept. I found them in northern Ohio in 1885; they seem to be extremely rare, I having found them on one occasion only and then only seven or eight individuals. From these I reared three female gall-flies, which are described as follows:

Gall-flies.—*Head* dull brownish black, the brownish hue only discernible in a strong light, and most apparent on the face and cheeks; a few scattered hairs on the vertex; antennæ dusky brownish black, slender, thirteen jointed, second joint short, globose, the third one-fourth longer than the first and second taken together, and the fourth equaling them in length, remaining ones nearly equal, and the terminal so closely joined that counting them is a difficult matter. *Thorax* black, somewhat hairy, but not evenly so; parapsidal grooves distinct towards the scutellum, but disappearing before reaching the collare; the two parallel lines on the anterior half of the mesonotum extremely faint, but smooth and shining; scutellum hoary, with suberect yellowish hairs, foveæ indistinct. *Abdomen* black, first segment short, second long, rather densely hairy on the sides; anteriorly the abdomen is compressed, truncate posteriorly and concealing almost wholly the remaining segments; ovipositor exerted, the sheath hairy at the tip. *Legs* brownish red; unguis two-toothed. *Wings* with a faint smoky tinge, large; veins distinct, but not heavy, brownish red; areolet medium size, the veins bounding it, except the second transverse, very slender; cubitus not quite reaching the first transverse, radial area open, rather narrow. Length: body, .12 inch.; wings, .12 inch.; antennæ, .11 inch.

4. **A. Howertoni** n. sp.

GALLS.—Woody, club-like enlargements of the tips of the twigs one of the New Mexican oaks, species uncertain. They bear some resemblance to the galls of *A. clavula* Bass. and *A. similis* Bass. When green they are covered with leaves even more completely than the first named well-known species, and these and their large stipules still adhere to the dried galls. They are monothalamous, the enclosed larval chamber is not free, and is placed near the base of the gall and immediately above it is a much larger, irregular open space, through which the insect passes in leaving the gall. The galls are rather irregular in shape, but when green are probably about three-fourths by one-half inch in diameter. In some specimens the gall does not wholly retard the axis of growth, and short, leafy stems project out of it.

By cutting open the galls I have secured a perfectly developed fly of the female sex. The description is as follows:

Gall-fly.—Entire insect a very dark reddish brown, clear, but not shining, the head lightest. *Antennæ* somewhat dusky, thirteen joints, first and second short, third one-half longer than the fourth, the remaining joints short, except the thirteenth, which shows an indistinct suture. *Thorax* darker than the head and easily taken for a dull black on account of the short, evenly disposed and closely appressed hairs that cover it and the scutellum; parapsidal grooves narrow and indistinct, hidden in the hairs; lines over the base of the wings more distinct, intermediate ridges quite imperceptible. *Abdomen* smooth and polished, second segment very long and with a few scattered hairs on the sides near the base. *Legs* dark red, somewhat paler at the joints; unguis two-toothed. *Wings* hyaline, veins pale brown; areolet small, cubitus indistinct; radial area open. Length: body, .12 inch.; wings, .13 inch.; antennæ, .08 inch.

Received from Mr. W. J. Howerton.

5. **A. Maxwelli** n. sp.

GALLS polythalamous, but rarely containing more than half a dozen larvæ. Globular or oval, though sometimes somewhat irregular in shape. From three-eighths to five-eighths of an inch in diameter, yellowish brown to dark brown, mostly smooth and shining, but some of my specimens are slightly rough and opaque. Internally, of a soft pith-like cellular tissue and without distinct larval cells.

I received these galls many years ago from Mr. W. R. Maxwell, of Palestine, Texas, but did not learn from what species of oak they were collected, nor whether they were leaf or twig galls, though they are probably the latter.

Gall-flies.—Male.—*Head* and thorax black and shining, with an approach to very dark, reddish brown when seen in strong light, beautifully and evenly, but very finely punctate on the vertex and the entire mesonotum; antennæ fifteen jointed, the first and second joints short, subequal, third a little longer than the two preceding taken together, club-shaped, slightly curved and incised, all the remaining joints gradually shortening and tapering to the end; mesonotum with two fine parallel lines extending half way from the collare to the scutellum, and a median dorsal line rather more than half way from the scutellum to the collare; parapsidal grooves very fine, smooth and shining and less convergent than usual; the lines usually found over the base of the wings are, in this species, reduced to short, oval indentations; scutellum dull opaque black, and finely rugose, the foveæ widely separated, polished, large, but not deep. *Abdomen* with slight tinge of brown, second segment very long, almost concealing the remaining ones. *Legs* a uniform brownish yellow, but a shade darker than the antennæ, unguis two-toothed. *Wings* hyaline, veins distinct, first transverse rather heavy and almost black; areolet small, cubitus pale, reaching the first transverse, second transverse angulated at the base of the open radial area, and the stump of a vein almost always present at the point of this angle very prominent in this species, and the second transverse vein stops suddenly before reaching the margin of the wing. Length: body, .11 inch.; wings, .12 inch.

Female.—*Head* and thorax very dark brownish red, punctation same as in the male; antennæ thirteen joints, a shade darker than the male; the mesonotum differs from the male as follows: there is no median line and the grooves over the base of the wings extend quite to the base of the scutellum, which is wrinkled rather than rugose and the foveæ less polished and less widely separated. *Abdomen* shining, and of the same dark red as the thorax. *Legs* darker than the male. *Wings* show no difference; unguis two-toothed, placing it in the genus *Andrieus*. Length of the body .12 inch.; wings, 14 inch.

Described from twelve specimens reared in April, 1877.

ACRASPIDIS Mayr.

1. *A. macrocarpæ* n. sp.

GALL perfectly oval in form, .15 of an inch in length by .12 in thickness. Generally found on the lateral veins on the underside of the leaves of *Quercus macrocarpa*, but occasionally found on the upperside. They are attached lengthwise to the vein and the point of attachment is .10 inch. long. The hole made by the escaping gall-fly is invariably on the end towards the base of the vein, but this is not always the case with the parasites that infest this species.

The surface presents a crackled appearance, fine lines dividing it into a large number of facets, each of which is crowned with a short hard point. The facets are angular in outline, and with from three to six unequal sides; they are never rectangular and the prevailing figure is an irregular pentagon. The color, when young, like that of the leaf. There is no free larval cell for the single larva and the space between the outer and inner surface of the gall is filled with a hard, crystalline, pinkish substance.

Twenty to twenty-five galls are sometimes found on a single leaf, but usually the number is much smaller.

The gall-flies are all females, with rudimentary wings; they leave the galls in the autumn, but their further history has not been traced.

Gall-flies. *Head* black; antennæ with fourteen joints, black, long and slender, first joint ovate, second small, oval: third twice as long as the two preceding taken together: the fourth, fifth, sixth and seventh, each gradually shorter; remaining ones short and subequal; face and cheeks hairy. *Thorax* grayish by reason of the short, appressed hairs; mesonotum very short, parapsidal grooves are present, but obscured by the hairs; scutellum comparatively large and elevated posteriorly and nearly as long as the mesonotum. *Wings* veinless, narrow scales as long as the entire thorax. *Abdomen* black, compressed laterally, and the sides of the second, third, fourth and fifth segments covered with short appressed hairs; dorsal and ventral parts and the terminal segments smooth, shining black. *Legs* dark brown; unguis two-toothed. Length: body, .11 inch.; antennæ, .10 inch.

I have collected these galls in northern Ohio and in St. Lawrence County, N. Y., and have received specimens from Mr. C. P. Gillette that were found in Michigan and Iowa. Those collected by myself grew on *Q. macrocarpa*.

2. **A. politus** n. sp.

Gall-flies.—Eutire insect black. *Head* smooth, shining; antennæ with fourteen distinct joints; first large, club-shaped, second oblong-ovate, third as long as the first and second taken together, fourth two-thirds as long as the third, remaining ones rather short. *Thorax* very small, smooth and shining; scutellum minute, short and apparently without foveæ; the usual rudimentary wings are absent. *Legs* brownish black and shining, except the tarsi, which are dusky and nearer brown than black. Length .07 inch.

Two specimens sent me by Dr. C. V. Riley, who received them from J. G. Barlow, of Washington County, Mo. I have no galls, and am not informed whether they were captured at large or reared from galls.

It is the smallest species known to me, and is closely allied to the genus *Biorhiza*.

AMPHIBOLIPS Reinh.

1. **A. Caroliniensis** n. sp.

The galls belong to the oak-apple family, and much resemble those of *A. spongifica* O. S. and *A. coccinea* O. S., but the surface is more coarsely reticulated and less glossy, and internally the spongy mass surrounding the larval cell is of a much darker color. The shell is also much thinner, and, in my dried specimens, is irregularly shrunken and depressed, until they look like pressed figs.

I am not sure as to the species of oak on which they grew, but the few immature leaves that came with the galls seem to be those of *Q. obtusiloba*. The galls are attached to the midvein near the base of the leaf and prevent its development beyond the point of attachment; they are as large as those of *A. spongifica*, and differ widely from *A. cinerea* described by Mr. Ashmead.

The single female gall-fly in my collection very closely resembles the two scarcely separable species just mentioned, but the head and thorax are black, while in those they are very dark brownish red. The parapsidal grooves are scarcely recognizable in the sculpturing, which is coarser than in the two species just named. The legs are a shade darker than the clear reddish brown of those and the abdomen has the same shining reddish brown, but the second segment is considerably shorter than in those. The wings are a shade less fuscous, the first transverse vein more distinctly defined, and the dark cloud in the base of the open radial area smaller and not involving the

small areolet, though reaching quite to it on the anterior side; ungues two-toothed. Length: body, .21 inch.; wings, .21 inch. (the antennæ broken.)

I received this species from Mr. M. E. Hyams, of Statesville, N. C.

2. **A. Palmeri** n. sp.

Two or three years ago I received from Mr. B. Pickman Mann a very large oak apple gall which he had received from Dr. Edward Palmer. It was written upon as follows: "Summit of Sierra Madre, Chihuahua, Mexico. Winter 1885-86, Dr. Edward Palmer."

It was the largest oak apple gall I had ever seen, and I kept it very carefully, hoping to rear an insect from it, but none appeared.

On this New Year's morning, 1890, I ventured to cut open the precious gall, and was rewarded by finding in it the largest gall-fly I have ever seen. The fly had eaten its way out of the larval cell, and to the outside shell, but becoming discouraged, it had backed its way into the cell again and died. In forcing itself back one of its wings had been turned towards the head and so remained.

It gives me very great pleasure to dedicate this remarkable species to the discoverer, Dr. Edward Palmer.

GALL.—This immense monothalamous gall is of a light yellowish brown color, round, and measuring two and three-fourths inches in diameter. The slightly uneven surface is polished and shining; the shell is thin, but firm, and the interior of a soft, uniform, spongy consistence throughout. The color is yellowish brown to almost white at the centre; the larval cell is oval, and measures three-eighths by five-sixteenths in diameter, and is one-sixteenth of an inch thick. The spongy substance immediately surrounding it is no more dense than in other parts.

Gall-fly.—Female.—Entire body black. *Head*: face unevenly wrinkled, vertex and thorax deeply and irregularly wrinkled; antennæ black, very short, thirteen jointed, first joint heavy, second short, third one-half longer than first and second together, fourth one-half as long as the third, the remaining short to the last, which is a little longer than the twelfth; mesonotum, two obscure parallel lines, and a line over the base of each wing and the faint parapsidal grooves can only be seen in a side light, and they scarcely interrupt the general rugosity of the surface; scutellum even more coarsely wrinkled than the other parts and unique, in that it is considerably broader in the middle than on the anterior side and is not only truncate posteriorly, but is really emarginate; foveæ large, rough, with a low irregular line separating them and a high ridge bounding them laterally, the whole polished and shining. *Abdomen* black, second segment occupies one-half of the whole, anterior half of this segment smooth and shining, and with a few scattered hairs, the posterior half and the visible parts of the remaining segments, all of which can be seen, distinctly and beautifully reticulated or

punctate, except a very narrow polished band on the margin of each. *Legs* black, shining and with a few scattered hairs. *Wings* dark, smoky brown, a very dark brown cloud covers the areolet and the lower half of the radial area; beyond this and extending across the radial area and almost to the posterior margin is a light, nearly colorless spot, and the anterior margin from the dark, broad, first transverse vein to a short distance beyond the second transverse is of the same light color, the tip of the wing beyond the light spot is of the same dark smoky hue as below this spot; the areolet well defined, but very small; radial area open, large and broad. Length: body, .27 inch.; wings, .24 inch.; antennæ, .13 inch.

NEUROTERUS Hartig.

1. *N. favosus* n. sp.

Flattened, polythalamous galls on the leaves of *Quercus tinctoria* varying in lateral diameter from one-fourth to almost an inch; they project from both surfaces of the leaf, but more prominently from the upper surface; their vertical diameter is not more than one-fourth of an inch. The upper and under surfaces, especially the first, bear a very close resemblance to a honey-comb. This resemblance is more striking after the insects have left, when the upper surface is literally full of holes. In general appearance they resemble the galls of *N. majalis* Bass., but when green they are less succulent, and when dry they are of an extremely hard, ligneous texture, while the others are soft and pith like. I collected old galls in September, 1888, from a single oak tree in Rockport, Ohio. This year my nephew, Charles Nichols, collected a large quantity from the same tree, and from them I have reared a large number of gall-flies. These are of both sexes, and are described as follows:

Gall-flies.—Male.—*Head* broader than the thorax, black, shining; cheeks with indistinct furrows; antennæ fifteen jointed, first dark brown, second lighter, and the remaining ones light yellowish brown; the first and second oblong oval, and nearly the same length; the third slightly longer than both the preceding, club-shaped and curved, but only slightly incised, remaining joints of uniform length and but a little shorter than the third, the whole exceeding by two or three joints the entire length of the body. *Thorax* black and shining, but a powerful magnifier reveals a finely and evenly crackled surface; parapsidal grooves apparent posteriorly, but soon disappearing; by the deeply incurved posterior margin of the mesothorax the scutellum has a rounded outline; furrow of moderate depth and foveæ subobsolete; surface of the scutellum same as the mesothorax. *Abdomen* small, black and shining, second segment in dry specimens almost concealing the remaining ones, but in the living insect the terminal ones are visible and form a cone-like termination to the abdomen. *Legs* light brown, somewhat darker in the middle of the femur and tibia; claws simple. *Wings* of moderate size, hyaline, but when in a certain light they show a faint steel-blue reflection; this is more noticeable where several hundred specimens are seen together; veins slender, brown, fading to colorless lines; areolet wanting. Length: body, .05 inch.; wings, .05 inch.; antennæ, .06 inch.

Female.—*Head* pale brown, shading to black on the posterior margin of the vertex; antennæ shorter than the body, pale yellowish brown, growing dusky

towards the end; first and second joints short, globose, the third very slender; the rest gradually thicker to the last. *Thorax* black, less shining and more coarsely cracked than in the male; the parapsidal grooves less distinct, and the scutellum less smooth than the male. *Abdomen* black, shining; the second segment longer than the remaining ones, but not concealing them. *Legs* dark brown, with paler joints. *Wings* hyaline, with the steel reflections noticed in the male; veins more distinct, areolet small, generally but not always present; radial area broader and shorter than in most of the gall-making Cynipidæ; the ovipositor is often seen fully exerted in the dry specimens, and is four or five times the length of the body. Length: body, .08 inch.; wings, .08 inch.; antennæ, .05 inch.

As other oaks of this species in this vicinity yielded no galls of this sort it may be that this colony is sporadic, and that its true habitat has not been discovered.

2. *N. pallidus* n. sp.

GALLS in dense clusters at or near the end of the aments of *Q.* bicolor, but seldom found on the basal half of the flower stems. It is safe to call them monothalamous, though now and then a gall is found that contains two larval cavities. The galls are of a fine, soft cellular consistence, easily crushed in the fingers, and contain no separate larval cell. They are of a pale, faded wood color and smooth, and unevenly globular. They seem to be free from the attacks of parasites, for among thousands of galls I fail to find a single one.

The flies mature earlier than the two species already described as found on the sterile flowers of the oak, for, when found, the insects had gone with the exception of a few belated ones, from which I have made the following description. They are of both sexes.

Gall-flies.—Female.—*Head*, except the dark eyes, almost colorless in some specimens, or at most of a pallid yellowish brown, and in others dark brown to a shining black on the vertex. *Legs* and the first three joints of the antennæ same color and semi-transparent; antennæ thirteen jointed, the first and second not differing much in form and size, both rather large, third long, pale, remaining changing gradually to a dusky brown; mesothorax smooth, shining throughout; scutellum also smooth and shining, foveæ wanting. *Legs* almost colorless, except a slight brownish tinge in the femur; unguis black, simple. *Abdomen* black, the diameter from the dorsum to the venter considerably more than the length. *Wings* large, hairy, veins dark and distinct, areolet of medium size, cubitus slender and reaching quite to the first transverse, radial area long, narrow, open. Length: body, .06 inch.; wings, .08 antennæ, .05 inch.; these measurements are from dry specimens and probably rather too small.

Male throughout of the same pallid hue seen in the antennæ, and legs of the female; antennæ fifteen jointed, otherwise as in the female. *Abdomen* small, briefly petiolate and the posterior dorsal portion darker than any other part of the body. *Wings* do not differ from those of the female.

3. *N. pallipes* n. sp.

GALLS small, monothalamous, variously situated on the stem and principal veins of very young white oak leaves, dwarfing and distorting them, and densely covered and often nearly hidden in their pubescence. They are oval, thin walled, and only large enough to contain the larva of the small gall-fly.

I have forty male and female insects of this species, but there is only one, a female, whose antennæ remains unbroken.

Gall-flies.—Both sexes are black and shining; the female antennæ with thirteen joints, and, like most of this genus, the first two joints very large, short, almost globose, and the rest long and slender; they are pale brown at the base, growing dusky towards the tips; the third joint is scarcely longer than the fourth; the male abdomen long, petiolated; the wings of both sexes large; the veins distinct, but not heavy; areolet large, and bounded by very slender veins, cubitus reaching the first transverse vein, radial area open, long and narrow; the legs in the female almost colorless, and in the male brown or brownish in the middle of the tibia and femur only. Length: body, .05 inch.; wings, .06 inch.

The insects differ materially from *N. utricula* Bass., though the galls resemble those quite nearly.

This species was received from Miss Cora A. Clarke, to whom I am indebted for several other very interesting species.

4. *N. politus* n. sp.

The galls are developed on the midvein of the leaves *Q. undulata*? and are three-fourths of an inch long and half as thick. They are polythalamous; larval cells perpendicular to the surface of the leaf. They might easily be taken for galls of *Andricus nigra*, *A. tumifica* and other species found on the midvein of oak leaves, but the insects are distinct from any produced from similar galls.

Gall-fly.—Male.—*Head* black; antennæ fourteen jointed, first and second joints pale yellow, remaining ones yellowish brown, all very slender. *Thorax* without furrows or grooves; thorax and abdomen black and very smooth; scutellum separated from the mesothorax by a smooth, shining furrow; a few scattered hairs on the posterior half of the scutellum. *Abdomen* long petiolated, second segment small, the remaining ones very small. *Legs* pale yellow. *Wings* large, veins brown, slender, the cubitus reaching the first transverse and of equal size throughout, areolet very small, radial area large, long and open.

My few specimens, cut from the galls, are too imperfect to furnish a more complete description. One of them, apparently a female, is considerably larger and with darker antennæ and legs, but I will not attempt a description from it.

The galls were found with those of *Andricus Sileri* from southern Utah.

5. **N. Howertoni** n. sp.

GALLS.—Minute blotches showing on both sides of the leaves of an oak (species unknown to me) found in New Mexico. They are a little less than .05 of an inch by .03 in diameter. I have only two leaves on which these galls occur, the largest, one inch by three-eighths, and on this there are eighteen galls, and they are by no means crowded. There is no free larval cell, and the gall walls are very thin. It is covered with the same pubescence as the rest of the leaf. On the upperside the color is a dull brown, beneath it is the same as the leaf. The insects perforate the gall on the underside.

Eight minute parasites were found in the box containing the galls and one true gall-fly. Six galls were perforated, but the insects had not been able to escape. I removed three of these dead flies and from the four more or less imperfect specimens get the following description :

Gall-flies all females. *Head* black; antennae fourteen jointed? (I am not quite sure as to the number of the joints); first and second of equal length, short and both very thick; the second thicker than long; remaining joints extremely slender and all pale yellowish brown, changing to dusky in the last six or seven joints. *Thorax* black, shining; scutellum less shining. *Abdomen* shining brown or black, compressed; ovipositor in all my specimens exerted and extending forward to the tip of the scutellum. *Legs*: middle of the femur and tibia dark shining brown or black, with pale joints; tarsi pale yellow. *Wings* not fully expanded, but showing pale brown veins, a large areolet, long radial area and the cubitus reaching only half way to the first transverse vein. Length of the body not quite .05 inch.

Named for Mr. W. J. Howerton, the discoverer.

AULAX Hartig.

Hartig, who founded this genus, wrote "*Aylax*" (Germer's Ent. Zeitschrift, II, pp. 186 and 195-96, and III, pp. 342-43), but changed the orthography to *Aulax* without remark in Vol. IV, p. 413, of the same work. Baron Osten Sacken places a parasitic species reared by him from the galls of *Cynips* (*Andricus*) *futilis* O. S. hesitatingly in this genus (adopting the name as first written), and later adds two other species, *A. pivata* and *A. sylvestris* also reared from oak galls. All these have since been removed to the closely related genus *Periclistis*, and it was left to Mr. W. H. Ashmead to describe the first American species that really belongs to this genus. His *Aulax Harringtoni* is described in the Trans. Am. Ent. Soc. XIV, p. 146.

To this I here add two new species, both reared from species of *Lactuca* or *Mulgedium* (either *L. Canadensis* or *M. leucophæum* I cannot determine which without the leaves and flowers of the plants) and both belonging to that section of the genus which Hartig has designated as gall producers. They are all gall makers as distinguished from true Inquilines, but they do not, in all cases, produce galls as the following descriptions will show :

1. ***A. podagræ*** n. sp.

The long, hollow stalks of *Lactuca*? *Canadensis* are often covered in the upper half for a considerable distance with rounded swellings of greater or less extent, that on being opened are found to contain numerous Cynipidous larvæ. The insects produced from these larvæ all have a closed radial area, and, without careful study, I placed them among the inquilinous species, and went on rearing insects in the hope of sometime finding the true gall-maker.

I found that the larvæ did not all live in the galls, but that the pith of the stalks was full of larvæ even where there were no indications of a gall. Sometimes the pith would contain larvæ several feet above and below the space where galls were to be seen.

The galls occur at the leaf nodes, where the ligneous walls of the stalk are thickest, and it may be that the eggs laid between the nodes are placed quite below the ligneous or fibrous part, and that the poison of the sting is inert in the purely cellular portion.

I offer this as a conjecture only, having no proof that this is the true explanation of a very curious fact.

These insects evidently belong to the genus *Aulax*, and, as above remarked, to the gall-making division.

The gall of *A. podagræ* is sufficiently described above, and the description of the fly is as follows :

Gall-flies. Female.—*Head* black, vertex finely reticulated or punctate; antennæ dark brownish red, thirteen joints, first long and club-shaped, second one-half as long, and the third only equal to the first in length, remaining equal and slightly less in length than the third. *Thorax* black, mesonotum with a few scattered hairs and with minute, transverse lines or wrinkles, two lines reaching half way to the scutellum, a median line, broad at its origin on the scutellum, but disappearing half way to the collare, parapsidal grooves entire, lines over the base of the wings; all these very slender, but distinct, and shining; the collare in this as in the species next described, very broad; scutellum rugose, foveæ very large and rugulose. *Abdomen* black, polished, second segment twice as long as the third, and both forming nearly the entire abdomen; feet the same color as the antennæ, deep brownish red. *Wings* hyaline, but showing, in a favorable light, a slight iridescence; veins dark, and of nearly uniform size, areolet medium size and well defined; radial area broad, closed. Length: body, .10 inch.; wings, .10 inch.; antennæ, .10 inch.

Male.—The male differs only in the usual sexual variations, viz., the antennæ fourteen jointed, the third joint curved and incised, the smaller abdomen and the smaller size.

Among the thousands of this species that are in my collection not more than one-tenth are males.

2. **A. tumidus** n. sp.

GALLS.—Swellings of the main stalks of that variety of *Lactuca* that is found in old and dry fields. They are commonly near the summit of the stalk, often in the panicle itself, and then covered with the short flower stems. They vary greatly in size from slight, knotty and irregular enlargements of the stalk to large and more or less regularly ovate galls two or three inches long and an inch in diameter. The larvæ are imbedded in the soft pith that usually nearly or quite fills the galls. They can hardly be said to have larval cells, though a thin transparent coating lines the cavity in which each one lies. They are polythalamous, though far less prolific than the species just described.

These galls attracted my attention many years ago, but I not only confounded them with the species last described, but consigned them both to the subfamily Inquilinæ, because of the closed radial area in the wings of the imago.

Gall-flies.—Female.—*Head* and thorax black; antennæ translucent brown at the base to dusky brown at the end, thirteen jointed, the first joint short and small, the third, fourth, fifth and sixth equal, remainder gradually shorter to the thirteenth, which is long, and shows an indistinct annulation; facial ridge broad and high, vertex finely and sharply reticulated; the head is more decidedly subquadrate than that of any other species known to me in the whole family of the Cynipidæ. *Thorax*, like the vertex, sharply reticulated; collare very broad; pleuræ beautifully striate; parallel lines on the mesothorax short, and so indistinct, as to be seen only in the most favorable light; median line short and narrow; parapsidal grooves very narrow, and almost parallel until close to the scutellum, where they converge; lines from the scutellum towards the base of the wings are not heavy, but quite distinct; the short, closely appressed, microscopic hairs on the thorax give to it a silky appearance and obscure somewhat the beautiful reticulation beneath; scutellum slightly rugose and with somewhat coarser microscopic hairs; foveæ large, shallow, not smooth. *Abdomen* shining, semi-translucent brown, second segment of moderate length, and with a small, dense tuft of hairs far down on the sides of the anterior margin, and easily overlooked; in some specimens a few hairs are seen over a much larger portion of this segment; third segment a little shorter than the second, and the remaining ones quite narrow. *Legs* dark reddish brown; ungues simple. *Wings* with a faint smoky tinge, veins yellowish brown, not heavy, areolet wanting, cubitus reaching two-thirds of the distance to the first transverse, radial area closed. Length: body, .14 inch.; antennæ, .10 inch.; wings, .12 inch.

Male.—Black, except the legs and antennæ; antennæ fourteen joints, third short curved and incised; all dark brownish red, legs yellowish brown. Length: body, .12 inch.; wings, .12 inch.; antennæ, .11 inch.